October 19-20, 2009
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US/Ireland Emerging Technologies Conference

Find out about cutting-edge research being conducted in:

- >> **Biopharmaceuticals and Bioprocessing**
- >> **Medical Device Technologies**
- >> **Nano/Biosensors**
- >> **Nanomanufacturing Technology for Biomedical Applications**

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UMASS University of Massachusetts Lowell

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US/Ireland Emerging Technologies Conference

CONFERENCE SESSIONS

Monday, October 19, 2009

Check-in & Registration 8:00am-8:30am

Morning Session 8:30am-Noon

BIOPHARMACEUTICALS AND BIOPROCESSING

A changing regulatory environment and the introduction of biosimilars has put pressure on biopharmaceutical manufacturers to lower production costs and refocus on product quality. These Biopharmaceuticals and Bioprocessing sessions will cover innovative production, purification, and analytical technologies that will help biomanufacturers solve these challenging industry conditions.

Innovative Technologies in the Manufacture of Biopharmaceuticals
Carl W. Lawton, Director, Massachusetts Biomanufacturing Center, University of Massachusetts Lowell

Developing Immunoassays for Bioprocess Analysis and Diagnostics
Richard O'Kennedy, Professor of Biotechnology and Vice President for Learning Innovation, Dublin City University

Ireland's Center for BioAnalytical Sciences: A Biopharmaceutical Perspective
Speaker from the Center for BioAnalytical Sciences

Better Enzymes for Biosensors
Dr. Ciarán Fagan, School of Biotechnology and National Centre for Sensor Research, Dublin City University

Covalent Aggregation of Protein Therapeutics – A Case Study
Jiu Xu, Director of Protein Sciences, Massachusetts Biomanufacturing Center, University of Massachusetts Lowell

Physical-Chemical Sensors: Application to Bioreactor Monitoring and Control
Richard Baggio, Senior Research Scientist, Millipore

Panel Discussion

Afternoon Session 1:00pm-4:30pm

MEDICAL DEVICE TECHNOLOGIES

Medical devices have emerged as an innovative and profitable area of research and development. The key to commercialization of novel medical devices is transitioning from a research lab through design, manufacturing, business formation and FDA/clinical approval. These Medical Device Technologies sessions will cover novel devices, MedTech start-ups, novel processing and tissue engineering, as well as clinical trials for medical devices.

Novel Medical Devices from Massachusetts Start-Ups
Stephen McCarthy, Co-Director M2D2, University of Massachusetts Lowell

Bone Substitute Materials
Dr. Nicholas Dunne, School of Mechanical and Aerospace Engineering, Queen's University

A Flexible Method for the Preparation of Tissue Engineering Scaffolds
Daniel Schmidt, Assistant Professor of Plastics Engineering, University of Massachusetts Lowell

Tailoring Resorption Rates of Biodegradable Polymers
Dr. Fraser Buchanan, Reader, School of Mechanical and Aerospace Engineering, Queen's University

Overcoming the Challenges of Clinical Trials for Medical Devices
Sheila Noone, Associate Vice Provost for Clinical Research, University of Massachusetts Worcester

Supercritical Fluid Assisted Processing of Polymers for Medical Use
Peter Hornsby, Queen's University

Multifunctional Additives for Medical Polymers
Tony McNally, Ph.D., Queen's University

Panel Discussion

Poster Sessions 4:30pm-6:00pm

Tuesday, October 20, 2009

Morning Session 8:30am-Noon

NANO/BIOSENSORS

These sessions will present novel, innovative nano- and micro-technology-based sensors aimed at point-of-care medical diagnostics, environmental monitoring, and chemical detection (including explosives). A variety of sensor platforms will be discussed, including antibody-based, living-cell-based, and electrical and optical property-based devices.

Sensors for Chemical and Biological Threats
James E. Whitten, University of Massachusetts Lowell

Advanced Polymer Micro- and Nanofabrication for Next Generation Diagnostic Lab-on-a-Chip Platforms
Jens Ducrée, PI Microfluidic Platforms, Biomedical Diagnostics Institute, Dublin City University

Novel Biosensor Platforms for Medical Diagnostics
Professor Brian D. MacCraith, School of Physical Sciences and Biomedical Diagnostics Institute, Dublin City University

In-Vivo Multi-Biomarker Nano-Biosensor
Ahmed Busnaina, W.L. Smith Professor and Director of the NSF Nanoscale Science and Engineering Center for High-rate Nanomanufacturing, Northeastern University

The Nanocanary: A Living Cell Biosensor for Environmental Monitoring
Professor Susan Braunhut, Biological Sciences, University of Massachusetts Lowell

Optical Fiber Sensors for Bioapplications
Xingwei Wang, Electrical and Computer Engineering, University of Massachusetts Lowell

Panel Discussion

Afternoon Session 1:00pm-4:00pm

NANOMANUFACTURING TECHNOLOGY FOR BIOMEDICAL APPLICATIONS

The transfer of nanoscience accomplishments into useful technology is severely hindered by a lack of understanding of the barriers to nanoscale manufacturing. Nanotechnology-based commercial products cannot be realized without first understanding how one can assemble and connect trillions of nanoelements, how to prevent failures and avoid defects, and how to develop responsible manufacturing processes. Speakers will present on recent micro and nanomanufacturing developments with focus on biological and medical applications.

Directed Assembly of Polymer Blends as Platforms for Bio/Medical Devices
Dr. Joey L. Mead, Deputy Director, NSF Center for High-Rate Nanomanufacturing and Co-Director Nanomanufacturing Center, University of Massachusetts Lowell

Processing and Performance of Polymer-Clay Nanocomposites: Implications for Processability and Performance in Medical Devices and Packaging
Dr. Eileen Harkin-Jones, School of Mechanical and Aerospace Engineering, Queen's University

BioModular Multi-Scale Systems
Dr. David Kazmer, Professor, University of Massachusetts Lowell

Molding Microstructures for Medical Applications
Dr. Carol Barry, Associate Director, NSF Center for High-Rate Nanomanufacturing and Co-Director Nanomanufacturing Center, University of Massachusetts Lowell

On-Line Monitoring of Nanocomposite/Biomaterial Compounding for Process Optimization
Dr. Marion McAfee, School of Mechanical and Aerospace Engineering, Queen's University

Panel Discussion

For further information, visit www.uml.edu/EmergingTech

Continental breakfast, lunch and refreshments will be provided at the conference.

CONFERENCE SESSIONS

Monday, October 19, 2009

Check-in & Registration 8:00am-8:30am

Morning Session 8:30am-Noon

BIOPHARMACEUTICALS AND BIOPROCESSING

Innovative Technologies in the Manufacture of Biopharmaceuticals

Carl W. Lawton, Director, Massachusetts Biomanufacturing Center, University of Massachusetts Lowell

Recent advances in innovative technologies address critical issues in the manufacture of biopharmaceuticals. This presentation will discuss work performed at the Massachusetts Biomanufacturing Center to evaluate UCOE (ubiquitous chromatin opening elements) for stabilizing gene expression, single use membrane chromatography, and ozone CIP (clean in place).

About the Speaker

Dr. Carl W. Lawton is an Associate Professor in the Department of Chemical Engineering and Director of the Massachusetts Biomanufacturing Center where he directs a staff that helps biotechnology companies with process development, evaluates innovative technologies, and develops training programs for industry.

Developing Immunoassays for Bioprocess Analysis and Diagnostics

Richard O'Kennedy, Professor of Biotechnology and Vice President for Learning Innovation, Dublin City University

Antibodies are ideal reagents for use in assay development and genetic engineering facilitates optimization of their performance characteristics in terms of specificity, sensitivity, structural format, stability and immobilization. Their generation and potential applications in a range of diagnostic and process-related analyses using sensors and other platforms will be described.

About the Speaker

Richard O'Kennedy is internationally recognized for his contributions in relation to antibody production and applications including antibody-based sensors and immunoanalysis, and has developed novel strategies for antibody generation including the use of antibody-derived fragments produced by genetic methods. He is an acknowledged world expert in the analysis, mode of action and effects of coumarins and coumarin-derived molecules including aflatoxins and warfarins.

Ireland's Center for BioAnalytical Sciences: A Biopharmaceutical Perspective

Speaker from the Center for BioAnalytical Sciences

Ireland's Center for Bio Analytical Sciences is an industry-academia collaboration utilizing the best academic research skills to resolve shared problems associated with research-intensive bioindustries. Based on the experience gained from the initial partnership, the concept is now expanding and is being utilized to bring novel and advanced bioanalytical solutions to the biopharmaceutical and life science industry sectors, including novel diagnostic and nanotechnologies.

Better Enzymes for Biosensors

Dr. Ciarán Fagan, School of Biotechnology and National Centre for Sensor Research, Dublin City University

Enzymes have many uses but their scope is limited by protein instability. We have performed chemical modification (CM) and genetic manipulation (GM) on the widely-used horseradish peroxidase (HRP). The lecture will show how these have led to more stable forms HRP. Biosensor-relevant improvements to HRP and another peroxidase will also be described.

About the Speaker

Ciarán Fagan is a senior lecturer at Dublin City University, where he is deputy head of the School of Biotechnology and a member of the National Centre for Sensors Research.

Covalent Aggregation of Protein Therapeutics – A Case Study

Jiu Xu, Director of Protein Sciences, Massachusetts Biomanufacturing Center, University of Massachusetts Lowell

Protein aggregation is a major concern of biomanufacturing. In this study, various biochemical, biophysical and molecular biology techniques were employed to elucidate the disulfide bond-related mechanism of protein aggregation.

About the Speaker

Dr. Jin Xu is the director of the Massachusetts Biomanufacturing Center (MBMC) Protein Analysis and Characterization laboratory and an assistant professor in the Chemistry Department at UMass Lowell. Dr. Xu currently oversees and actively participates in protein structural/functional studies, protein product characterization and analytical development at MBMC. With his expertise in protein chemistry and biophysics, Dr. Xu also designs and conducts studies on the relationship between protein folding and protein productivity/quality. Before joining UMass Lowell, Dr. Xu received his Ph.D. in Biochemistry from the University of North Texas. Afterwards he worked as senior research scientist and principal scientist at Wyeth Pharmaceuticals for over five years, before most recently establishing and leading the protein chemistry group at Percivia, LLC.

Physical-Chemical Sensors: Application to Bioreactor Monitoring and Control

Richard Baggio, Senior Research Scientist, Millipore

Real-time bioprocess monitoring is fundamental to maximize yield, improve efficiency and process reproducibility, minimize costs, optimize product quality, and fully understand how a system works. These results offer insight into how the application of new optical probes and both NIR and dielectric spectroscopy can more fully integrate the PAT initiative in a bioreactor workflow to improve product quality.

Panel Discussion

Afternoon Session 1:00pm-4:30pm

MEDICAL DEVICE TECHNOLOGIES

Novel Medical Devices from Massachusetts Start-Ups

Stephen McCarthy, Co-Director M2D2, University of Massachusetts Lowell

An overview of M2D2 (Massachusetts Medical Device Development Center) and the current medical devices being developed will be presented. These novel devices include biodegradable drug eluting stents, nanosphere-antibiotic corneal contact lenses, photochemical tissue bonding, and RF bone welding.

About the Speaker

Stephen McCarthy is a Professor of Plastics Engineering at the University of Massachusetts Lowell and Co-Director of the Massachusetts Medical Device Development Center at UMass Lowell and UMass Worcester. He is also Director of the Biodegradable Polymer Research Center where he is conducting research into Biodegradable Polymers and Blends. He currently serves as editor for the *Journal of Polymer and the Environment*. He received his B.S. from Southeastern Massachusetts University, a Master's in Chemical Engineering from Princeton University, and a Ph.D. in Macromolecular Science from Case Western University in Cleveland, Ohio. He worked as an Advanced Engineer in R&D for Owens Corning Fiberglas in Granville, Ohio.

Bone Substitute Materials

Dr. Nicholas Dunne, School of Mechanical and Aerospace Engineering, Queen's University

Calcium phosphate cements have attracted a great deal of interest as possible bone substitute materials due to their ability to produce hydroxyapatite demonstrating chemical and crystallographic structures similar to that naturally present in bone. Calcium phosphate cements can be delivered through a cannulated needle to an anatomical site or molded to a desired shape to fill a bone defect. However, calcium phosphate cements are recognized for their low compressive strength and susceptibility to brittle fracture, which significantly limits their use in load-bearing orthopaedic applications. This presentation will explore different strategies for augmenting the load-bearing capabilities of calcium phosphate bone cements.

About the Speaker

Dr. Nicholas Dunne is a Senior Lecturer of Biomaterials and Medical Devices at Queen's University. He has developed a strong, interdisciplinary research program complimented with over-arching institutional and industrial collaborations. His field of expertise focuses on two main areas: 1) development and understanding of cement-based materials for hard tissue replacement and 2) development of hierarchical constructs for tissue engineering.

A Flexible Method for the Preparation of Tissue Engineering Scaffolds

Daniel Schmidt, Assistant Professor of Plastics Engineering, University of Massachusetts Lowell

One of the major barriers to successful regenerative medicine is the availability of appropriate scaffolds on which living tissue is able to form. Here, organic sol-gel chemistry is presented as a novel approach to the creation of such scaffolds. This flexibility of this method comes from its general applicability to a wide range of polymeric materials, as well as the possibility to alter structure independent of composition or vice-versa. Additional examples of the ability to achieve multifunctionality include the replication of biologically relevant porous bodies, the preparation of materials with shape-memory characteristics and the selection of materials designed to produce potentially therapeutic degradation products.

About the Speaker

Prior to joining UMass Lowell in 2005, Daniel Schmidt performed undergraduate studies in Chemistry and Materials Science at Carnegie Mellon University, doctoral work in Materials Science at Cornell University, and a two-year stint with BASF in Strasbourg, France. His research interests include polymer / layered nanofiller nanocomposites, porous and non-porous sol-gel derived materials, new polymer and hybrid synthesis (primarily networks) via step-growth / polycondensation reactions, as well as preceramic polymers and materials analysis.

Tailoring Resorption Rates of Biodegradable Polymers

Dr. Fraser Buchanan, Reader, School of Mechanical and Aerospace Engineering, Queen's University

Bioresorbable polymers such as polylactic acid (PLA), polyglycolic acid (PGA) and copolymers are widely used in medical devices, however their degradation behavior is not ideal as they tend to lose strength well before any significant loss in mass. This presentation will cover methods to evaluate bioresorbable polymers, including accelerated aging, as well as approaches to tailor the degradation rate.

About the Speaker

Dr. Fraser Buchanan is a member of the Polymer Research Cluster at Queen's University, where he coordinates a number of medical device related research activities in bioresorbable polymers, calcium phosphate ceramics and marine derived biomaterials.

Overcoming the Challenges of Clinical Trials for Medical Devices

Sheila Noone, Associate Vice Provost for Clinical Research, University of Massachusetts Worcester

All clinical trials, including medical device studies, rely on an efficient and reliable infrastructure to ensure success. This is a particular challenge in a highly matrixed academic health center. This presentation will highlight the shared responsibilities of sponsor, institution and research staff over the life cycle of the clinical trial to achieve study success.

About the Speaker

Sheila B. Noone, Ph.D., is Assistant Vice Provost for Clinical Research at University of Massachusetts Worcester. She has responsibility for the oversight of clinical research practice, clinical study agreements, training and education, and the Institutional Review Board (IRB). Along with Professor Stephen McCarthy, she is Co-Director of the Massachusetts Medical Device Development Center (M2D2).

About UMass Lowell

UMass Lowell is a comprehensive university with a national reputation in science, engineering and technology, and committed to educating students for lifelong success in a diverse world and conducting research and outreach activities that sustain the economic, environmental and social health of the region. Located in the historic industrial city of Lowell, 25 miles northwest of Boston, the campus spans more than 125 acres along the Merrimack River. More than 12,000 resident and commuter students of all backgrounds pursue bachelor's, master's, and doctoral degrees as well as professional certificates in the arts, humanities and sciences; education; engineering; health and environment; and management. UMass Lowell is a nationally ranked research university with more than $50 million in funded research being conducted each year.

Supercritical Fluid Assisted Processing of Polymers for Medical Use

Peter Hornsby, Queen's University

Supercritical carbon dioxide can exert a strong transient plasticizing effect to many polymers during melt processing resulting in decreased viscosity, thereby providing an opportunity to reduce processing temperatures or limit mechanical damage to the material. The application of this approach will be discussed with reference to extrusion technology and the processing benefits achievable, including its use with inherently thermally unstable polymers and modifying additives used for medical purposes.

About the Speaker

Peter Hornsby is Professor of Polymer Engineering at Queen's University and Director of the Polymers Research Cluster in the School of Mechanical and Aerospace Engineering. His current research interests relate to the development of novel polymer processing technologies and the formulation and processing of polymers containing nano-fillers.

Multifunctional Additives for Medical Polymers

Tony McNally, Ph.D., Queen's University

This presentation will be divided into two parts: 1) the role of ionic liquids as both plasticisers and antimicrobial agents for use with PVC, and 2) the use of nanoparticles to retard drug release from biopolymers will be described.

About the Speaker

Tony McNally is a faculty member in the School of Mechanical and Aerospace Engineering at Queen's University. His current research interests include polymer layered silicate nanocomposites for drug delivery; ionic liquid modification of nanoclays; composites of polymers with carbon nanotubes, MoSI nanowires, POSS and graphene; multifunctional ionic liquids as additives for medical polymers.

Panel Discussion

Poster Sessions 4:30pm-6:00pm

Tuesday, October 20, 2009

Morning Session 8:30am-Noon

NANO/BIOSENSORS

Sensors for Chemical and Biological Threats

James E. Whitten, University of Massachusetts Lowell
A variety of nanotechnology-based sensors are being developed at the University of Massachusetts Lowell to address chemical and biological threats of relevance to the United States Army. These sensors lend themselves to high-rate nanomanufacturing methods that will make possible their cost-effective mass production. An overview of the UMass Lowell research efforts will be presented, with emphasis on chemiresistive, functionalized gold nanoparticle films useful for the detection of chemical vapors, including explosives.

About the Speaker
James E. Whitten is a Professor of Chemistry at the University of Massachusetts Lowell and member of the Center for High-Rate Nanomanufacturing (CHN). His research group has expertise in chemical sensors, organic electronic interfaces, metal oxide surface chemistry, conjugated polymer films, and self-assembled monolayers.

Advanced Polymer Micro- and Nanofabrication for Next Generation Diagnostic Lab-on-a-Chip Platforms

Jens Ducrée, PI Microfluidic Platforms, Biomedical Diagnostics Institute, Dublin City University
The translation of leading-edge research in biomedical diagnostics into patient-friendly point-of-care devices based on smart micro- and nanofluidic operating principles will require sophisticated polymer fabrication technologies. This presentation will cover important aspects of the emerging program on multi-scale polymer micro- and nanomachining and highlight recent developments on novel lab-on-a-chip platforms for application in the life sciences at the Biomedical Diagnostics Institute.

About the Speaker
Jens Ducrée is an Associate Professor for Microsystems at Dublin City University, a PI for Microfluidic Platforms at the Biomedical Diagnostics Institute and the Director of the Polymer MicroNanoFab at the National Centre for Sensor Research. Before moving to Ireland in May 2008, he initiated and headed the group "Lab-on-a-Chip Systems" and the "Lab-on-a-Chip Foundry Service" at the Institute of Microsystems Engineering (IMTEK) and the HSG-IMIT in Freiburg, Germany.

Novel Biosensor Platforms for Medical Diagnostics

Professor Brian D. MacCraith, School of Physical Sciences and Biomedical Diagnostics Institute, Dublin City University
In the coming decades, innovative biosensors will play an increasingly important role in the area of healthcare in both the developed and developing world. These devices will often be disposable and will rely on the integration of recent developments in a range of sciences and technologies, such as nanotechnology, microfluidics (lab-on-a-chip) and photonics. This presentation will discuss emerging strategies that will yield substantial enhancements in the analytical performance of optical biochip platforms, especially for point-of-care (POC) diagnostic applications.

About the Speaker
Brian D. MacCraith is Professor of Physics and Director of the BDI (www.bdi.ie) at Dublin City University. The BDI is an Industry-Academic-Clinical partnership involving over 120 researchers. Brian's research interests are in nanobiophotonics, optical biosensor platforms and fluorescence enhancement strategies.

In-Vivo Multi-Biomarker Nano-Biosensor

Ahmed Busnaina, W.L. Smith Professor and Director of the NSF Nanoscale Science and Engineering Center for High-rate Nanomanufacturing, Northeastern University
There is a need for multifunctional nanosystems for the simultaneous monitoring of a variety of biomarkers in biological fluids to assess the progress of disease, toxicity, stress, etc. Further, the use of such devices for multidrug release in real time disease treatment is an important goal. The detection of biomarkers in combination with controlled drug release represents an exciting long term application of multifunctional nanosystems. Northeastern University's NSF Nanoscale Science and Engineering Center for High-rate Nanomanufacturing (CHN) developed a new process for selective assembly of nanoparticles into designated nanotrenches to yield structures for such multipurpose devices.

About the Speaker
Ahmed A. Busnaina, Ph.D., is the William Lincoln Smith Chair Professor and Director of National Science Foundation's Nanoscale Science and Engineering Center (NSEC) for High-rate Nanomanufacturing and the NSF Center for Nano and Microcontamination Control at Northeastern University, Boston, MA. He is internationally recognized for his work on nano and micro scale defects (particulate and chemical) mitigation and removal in semiconductor fabrication. He also involved in the fabrication of nanoscale wires, structures and interconnects. He specializes in directed assembly of nanoelements and in the fabrication of micro and nanoscale structures.

The Nanocanary: A Living Cell Biosensor for Environmental Monitoring

Professor Susan Braunhut, Biological Sciences, University of Massachusetts Lowell
The number and variety of engineered nanomaterials (ENMs) being manufactured and in commercial use is increasing rapidly and yet many of these materials have not been evaluated for their environmental safety. We have developed a biosensor using live pulmonary cells and quartz crystal nanobalance technology that can detect and distinquish in real time cellular responses to diverse ENMs, representing different doses and different degrees of cellular toxicity.

About the Speaker
Dr. Susan Braunhut is a Full Professor in the Department of Biological Sciences at the University of Massachusetts Lowell. She oversees a team of postdoctoral fellows, staff and students working in the areas of radiation biology, cancer therapy and diagnosis and biosensors for counterterrorism and environmental monitoring of aerosolized cytotoxic carbon nanotubes and other nanomaterials.

Afternoon Session 1:00pm-4:00pm

NANOMANUFACTURING TECHNOLOGY FOR BIOMEDICAL APPLICATIONS

Directed Assembly of Polymer Blends as Platforms for Bio/Medical Devices

Dr. Joey L. Mead, Deputy Director, NSF Center for High-Rate Nanomanufacturing and Co-Director Nanomanufacturing Center, University of Massachusetts Lowell
Nanoscale templates have been used to direct the assembly polymer blends into uniform and nonuniform patterns. Chemically functionalized templates have assembled two polymers in 30 seconds directly from a solution of the two polymers. The approach can be used to generate a variety of complex geometries including 900 bends, T-junctions, square and circle arrays, which have potential applications in fabrication of biosensors and platforms for other biomedical applications. Electrophoretic assembly processes have been used to assemble conducting polymers followed by transfer to a secondary substrate to produce patterned polymer structures. These structures have application for electrically-based biosensors.

About the Speaker
Dr. Joey Mead is a Professor in the Department of Plastics Engineering at UMass Lowell and Deputy Director of the NSF funded Center for High-Rate Nanomanufacturing (a collaboration between Northeastern University, UMass Lowell, and the University of New Hampshire). She is Co-Director of UMass Lowell's Nanomanufacturing Center. Her research interests include Elastomers, thermoplastic elastomers, nanomanufacturing, electrospinning, mechanical behavior of elastomers and polymers, recycling of rubber and elastomeric barrier materials.

Processing and Performance of Polymer-Clay Nanocomposites: Implications for Processability and Performance in Medical Devices and Packaging

Dr. Eileen Harkin-Jones, School of Mechanical and Aerospace Engineering, Queen's University
The processability of polymers can be significantly altered by the presence of nanoclay while the complex deformation and thermal regimes in industrial processes have an important influence on polymer-clay structuring and performance. In this presentation these aspects of polymer-clay nanocomposites processing will be examined and possibilities for tailored structuring in devices and packaging will be examined.

About the Speaker
Dr. Eileen Harkin-Jones is a Professor in the School of Mechanical and Aerospace Engineering at Queen's University. Her research is focused on polymer processing including rotational molding, thermoforming and blow molding. She is a member of the Institute of Materials, Polymer Processing and Engineering National Committee.

BioModular Multi-Scale Systems

Dr. David Kazmer, Professor, University of Massachusetts Lowell
The design, modeling, fabrication, testing and manufacturing of a low-cost, mixed-scale system is described. The Molecular Processing System under development will possess the ability to analyze different inputs in near real time for a variety of molecular signatures in applications such as homeland security, biological discovery, forensics and diagnostics. The technologies are focused on multi-scale and bio-modular design approaches that utilize paradigm-shifting molecular assays to offer near real-time readout at the single-molecule level. Some of the current challenges regarding high-performance materials and high production rate manufacturing of the bio-modules are discussed.

About the Speaker
Dr. David Kazmer is a Professor in the Department of Plastics Engineering at the University of Massachusetts Lowell. Dr. Kazmer is researching advanced capabilities in design of manufacturing processes, focusing on molding process simulation and development as well as product and machine design towards integrated product and process engineering. He teaches courses pertaining to process engineering, mold design, process control, and process simulation.

Molding Microstructures for Medical Applications

Dr. Carol Barry, Associate Director, NSF Center for High-Rate Nanomanufacturing and Co-Director Nanomanufacturing Center, University of Massachusetts Lowell
Use of polymers offer opportunities for cost-effective, high-rate manufacturing of microfluidic devices and other products with micro and nanoscale structures. This presentation will cover the major technologies emerging for molding microstructured polymeric devices, (hot embossing, nanoimprint lithography, and injection molding) and creating the tooling (molds) for these processes. The capabilities and limitations of each process will be discussed, specifically with respect to replication of feature sizes, shapes, and surfaces.

About the Speaker
Dr. Carol Barry is a Professor in the Department of Plastics Engineering at UMass Lowell, Associate Director of the NSF funded Center for High-Rate Nanomanufacturing (a collaboration between Northeastern University, UMass Lowell, and the University of New Hampshire). She is Co-Director of UMass Lowell's Nanomanufacturing Center. Her research areas include extrusion, injection molding, novel processing techniques and analysis, and nanoscale plastics processing.

On-Line Monitoring of Nanocomposite / Biomaterial Compounding for Process Optimization

Dr. Marion McAfee, School of Mechanical and Aerospace Engineering, Queen's University
Interest in nanocomposites has grown exponentially over the past decade. However, several years and much research effort later, there are few commercial applications of nanocomposite polymers worldwide. It is known that processing conditions play a major role in successful nanocomposite production but there is little agreement among researchers on the relative effects of various processing conditions on factors such as clay dispersion. This presentation will cover novel methods for on-line monitoring of nanocomposite compounding, which can be used for better fundamental understanding of the process and ultimately achieve greater optimization and consistency of nanocomposite quality. Applications of such sensors in monitoring processing of degradation-prone biomaterials will also be discussed.

Optical Fiber Sensors for Bioapplications

Xingwei Wang, Electrical and Computer Engineering, University of Massachusetts Lowell

Optical fiber has its unique advantages when applied in biomedical sensing areas due to its small size, low signal loss, high sensitivity, biocompatibility, and immunity to electromagnetic interferences. This presentation will mainly focus on a blood pressure sensor that can be inserted into a standard guidewire for real-time blood pressure measurement inside the arteries.

About the Speaker

Xingwei Wang is an Assistant Professor at the University of Massachusetts Lowell in the Department of Electrical and Computer Engineering. She has a unique combination of expertise in electrical engineering, optics, and sensor technology. She has nine years experience in the optical sensor area, and her research in the fields of optical sensors, in biomedical and harsh environment applications, MEMS, and sensor control has been disseminated through many journal and conference publications. Dr. Wang received her Ph.D. and M.S. in Electrical Engineering from Virginia Tech.

Panel Discussion

[redacted]

About the Speaker

Dr. Marion McAfee is a Lecturer in the School of Mechanical and Aerospace Engineering at Queen's University. Her research interests involve on-line monitoring, modeling and control of polymer and biomaterial processing and predictive modeling of biomaterials in-vivo. Current projects include soft-sensor and fault detection techniques for extrusion; ultrasound-assisted recyclate processing; nanocomposite processing; and predictive modeling of CaP and bioresorbable polymer behavior.

Panel Discussion

Note: Conference schedule is subject to change. Please refer to the conference website (www.uml.edu/EmergingTech) for any updates to the schedule.

A unique opportunity to learn from and interact with researchers and discover collaborative opportunities to develop the next generation of innovative products.

Register for the Conference

Register by phone, fax or mail by Friday, October 16, 2009. Registrations will not be processed unless accompanied by a check, purchase order or credit card information. Cancellations must be made by Friday, October 16, 2009. There will be no refunds for cancellations after that date.

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Please print clearly or type. Photocopy for additional forms.

Attendee Information

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Conference Registration

☐ **Total: $350**
Save $50 – Pay only $300 if you register by October 1st. Continental breakfast, lunch and refreshments will be provided at the conference.

Payment Method

Please note we cannot accept American Express.

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Please fax a copy of your PO to 978-934-2028 or mail it to the address above with your registration. A copy of the PO is REQUIRED in order to process your registration.

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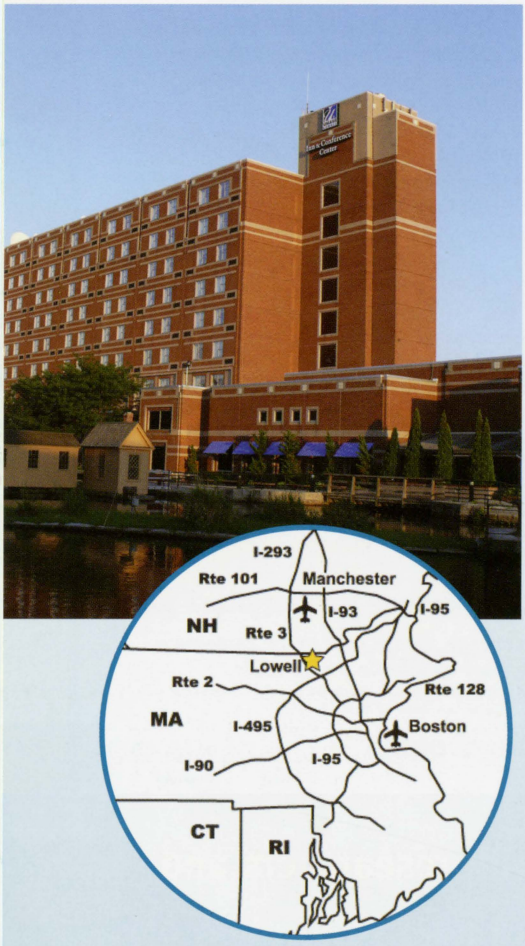
Location and Accommodations

The Emerging Technologies Conference will be held at UMass Lowell's new state-of-the-art Inn & Conference Center located at 50 Warren Street, Lowell, MA. Hotels are conveniently located throughout the area. Please visit the conference website (www.uml.edu/EmergingTech) for further information on area accommodations.

Don't miss this unique opportunity to hear about cutting-edge research in biomanufacturing, bioprocessing, medical device development, and diagnostics.

Researchers from the US and Ireland will come together to present innovative research that may help shape the future of how we use nanotechnology and biological sciences in manufacturing and medical diagnostics.



See conference website for directions to UMass Lowell's Inn & Conference Center.
www.uml.edu/EmergingTech

Exhibitors

For information on exhibiting at the conference, email EmergingTechnology@uml.edu or call 978-934-2186.

Conference Location and Travel

The Emerging Technologies Conference will be held at UMass Lowell's new state-of-the-art Inn & Conference Center in Lowell, MA.

UMass Lowell Inn & Conference Center
50 Warren Street
Lowell, MA 01852

About Lowell

Lowell is a city rich in history and culture. Home to the University of Massachusetts Lowell, the city is conveniently located between two major airports: Logan International Airport in Boston, MA and Manchester-Boston Regional Airport in Manchester, NH. From Boston, Lowell is a 30 minute ride by commuter rail or car. America's Industrial Revolution began here and is commemorated at the Lowell National Historical Park, where visitors can tour the canals, textile mills, and "mill girl" boarding houses that tell the story of the transition from farm to factory. With sports events, historical parks, museums, and theaters, Lowell has something for everyone. For additional information on Lowell and the surrounding areas, visit http://www.merrimackvalley.org.

US/Ireland

Emerging Technologies Conference

October 19-20, 2009
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Don't miss this unique opportunity to learn about cutting-edge research in nanotechnology, biomanufacturing, bioprocessing, medical device development, and diagnostics.

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